

INDEPENDENT LEARNING PROJECTS FOR DEVELOPING THE DESIGN ACTIVITIES OF FUTURE TEACHERS IN A DIGITAL LEARNING ENVIRONMENT

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ABSTRACT: This article examines the role and significance of independent learning projects in developing the design activities of future technology teachers within a digital learning environment. The study analyzes the didactic potential of graphic design, 3D modeling technologies (Autodesk Maya, Blender, Cinema 4D), and cloud-based CAD systems in the professional training of future specialists. The author has developed a six-stage framework for developing design activity, ranging from the motivational-target stage to the commercialization of the final product. Furthermore, the methodology for fostering students' systems thinking, communicative competence, and self-management skills is substantiated.

Keywords: Digital learning environment, independent learning, design activity, 3D modeling, systems thinking, project-based activity, CAD, technological education.

АННОТАЦИЯ. В данной статье рассматривается роль проектов самостоятельного обучения в развитии дизайнерской деятельности будущих учителей технологии в условиях цифровой образовательной среды. В исследовании анализируются дидактические возможности графического дизайна, технологий 3D-моделирования (Autodesk Maya, Blender, Cinema 4D) и облачных платформ (Cloud-based CAD systems) в профессиональной подготовке будущих специалистов. Автором разработана 6-этапная структура развития дизайнерской деятельности: от мотивационно-целевого этапа до коммерциализации готового продукта. Также обоснована методика формирования у студентов системного мышления, коммуникативной компетенции и навыков самоменеджмента (self-management).

Ключевые слова: цифровая образовательная среда, самостоятельное обучение, дизайнерская деятельность, 3D-моделирование, системное мышление, проектная деятельность, САПР, технологическое образование.

INTRODUCTION

In the context of transforming the modern pedagogical education system, developing not only the theoretical knowledge of future teachers but also their creative-design competencies in a digital environment has become a pressing issue. As defined in the relevant decrees of the President of the Republic of Uzbekistan, improving the quality of pedagogical education and the wide implementation of digital technologies in the educational process are of strategic importance.

Design activity is a complex intellectual and practical process that requires a future teacher to possess systems thinking, aesthetic taste, and mastery of modern ICT tools. Today, the process of independent education has evolved from mere information gathering into a platform for realizing the student's personal and professional potential through Project-Based Learning (PBL). Professional graphic software and virtual modeling technologies allow for more accurate, faster, and cost-effective garment design compared to traditional methods. The purpose of this article is to highlight the scientific and methodological foundations of systematically organizing the independent design activities of future teachers in a digital environment.

MAIN PART

Expanding the scope of independent education in a digital learning environment provides opportunities to use 3D modeling technologies in graphic design. Professional programs such as Autodesk Maya, Blender, and Cinema 4D can be used to visualize garment models and create their animations. As noted by researcher T. Bazarova and others [4], information technology allows for the demonstration of virtual models on the human body (virtual mannequins) in the garment industry and design—tasks that are difficult or impossible to achieve through traditional methods. This serves to implement garment design and gradation processes based on precise measurements in an economically efficient manner.

During the independent learning process, future teachers systematically acquire design skills. Project activity is divided into the following types based on its duration and direction:

- **Practice-oriented projects:** Creating designs that meet manufacturing needs.
- **Research and information projects:** Analyzing innovations in the field.
- **Creative and role-playing projects:** Working on creative models and team presentations.

Working on a project encompasses the stages of planning, model development, and final presentation. Sh. Kuliyeva [5] and her co-authors emphasize that technical creativity expands students' thinking horizons and forms qualities of an active and independent individual. This serves as a key factor for future teachers to effectively organize creative-technical activities with school students.

Systems thinking is an intellectual activity aimed at perceiving objects and phenomena as a whole, considering the complex internal connections between them. Any object, process, or artistic image constitutes a specific system. Researcher G.K. Selevko describes thinking as a process of understanding world phenomena, solving vital problems, and forecasting the future.

In pedagogical research, a systems approach allows the holistic educational process to be interpreted as a single system. As D.I. Mustafakulova and U.N. Usanov [6] noted, in systemic research, every element of an object is analyzed through the prism of its integral properties. In garment design, systems thinking is invaluable. This process involves a systemic analysis of the design problem (the balance of form, function, material, and technology) and developing the final constructive solution by resolving all systemic obstacles in interrelation.

Working in groups and exchanging ideas on digital platforms serves to develop design activity in a collective form. M. Toshtemirova [7] points out that communicative and cooperative competencies are closely linked, representing the ability to communicate effectively and unite for a common goal. When designing clothing, students can establish remote communication through cloud-based CAD systems and collaborate on shared projects. This forms not only technical skills but also a culture of project management within a team.

Research by V.N. Ivanov [8] shows that digital literacy plays a decisive role in developing students' independent learning competence under the digitalization of education. Due to the high flow of information in a digital environment, the formation of the following qualities becomes a pedagogical necessity:

1. **Information sorting and analysis:** Identifying reliable sources and applying relevant data to the design project.
2. **Critical thinking:** Evaluating digital design solutions and critically analyzing their technical capabilities.
3. **Self-management:** Correctly allocating time, setting goals, and planning project stages during independent study.

STRUCTURE OF DEVELOPING DESIGN ACTIVITIES

The process of preparing future technology teachers is a complex multi-stage system covering the entire cycle from motivation to commercialization. This structure consists of 6 main stages:

1. **Motivational-Target Stage:** Diagnosing personal interests and forming a sustainable internal motivation for design activities.
2. **Theoretical-Information Stage:** Mastering fundamental design principles (composition, color theory, ergonomics) and analyzing modern trends.
3. **Practical-Operational Stage:** Mastering specialized software and CAD systems (AutoCAD, RedCafe, "Gratsiya") through mini-projects.
4. **Project-Creative Stage:** Developing complex design projects for technology classes and creating interactive educational modules.
5. **Analysis-Evaluation Stage:** Conducting peer reviews and internal analysis based on functionality, aesthetics, and ergonomics.
6. **Presentation and Commercialization Stage:** Implementing design solutions into the educational process or proposing successful models to manufacturing enterprises.

CONCLUSION

Research on developing the design activities of future teachers through independent learning projects in a digital environment leads to the following conclusions:

1. **Technological Integration:** Utilizing 3D modeling software like Autodesk Maya and Blender enables students to visualize garment models on virtual avatars and perform grading efficiently.
2. **Systemic Approach:** Organizing design activity based on a 6-stage structure forms a holistic level of preparation for the student.
3. **Transformation of Personal Qualities:** Independent project activity fosters modern "soft skills" such as critical thinking and self-management.
4. **Socio-Economic Efficiency:** The opportunity to commercialize design solutions helps enrich the material-technical base of higher education institutions and increases professional motivation.

In conclusion, the synthesis of the digital environment and independent education serves as a guarantee for preparing a future teacher not only as an educator but also as a creative designer and technological process manager.

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